

## Influence of monsoon regime and microclimate on soil respiration in the tropical forests

### ABSTRACT

The consequence of precipitation and how environmental factors influence soil respiration remain poorly understood in the tropical forest ecosystems under a monsoon climate in Malaysia. This study was conducted in a recovering tropical lowland Dipterocarpus forest in Peninsular Malaysia, and its monthly variations were examined in association with changing precipitation. Soil respiration was measured using a continuous open flow chamber system connected to a multi gas-handling unit and an infrared gas analyser. The aim of this study was to determine the effects of the monsoon period and microclimate of the tropical region on soil respiration. The average monthly soil respiration rates were 152.79 to 528.67, 120.97 to 500.73, 106.77 to 472.89, 122.89 to 453.89 and 120.33 to 434.89  $\text{mg m}^{-2} \text{h}^{-1}$  in the respective months from September to January. The emission rate varied across the days and months, with the highest value recorded between September and October, and then gradually decreasing from November to January. Soil temperature explained more than 90% of the soil respiration rate whereas precipitation had a major effect during the monsoon regime. Soil organic carbon (SOC), total organic carbon (TOC), soil organic carbon stock (SOCstock), forest biomass, carbon to nitrogen ratio (C/N) and soil pH were found to vary in considerable amounts, provide nutrients and the environment favourable for microorganism activities, leading to emission of soil  $\text{CO}_2$ . The low values of soil respiration rate between November and January were due not only on the amount of soil moisture and water potential but also on the intensity and frequency of precipitation. Therefore, these results indicate that the monsoon regime can significantly alter the emission of soil  $\text{CO}_2$  and influence the microclimatic conditions and other environmental factors.

**Keyword:** Bulk density; Environmental factors; Forest biomass; Precipitation; Soil organic carbon; Soil respiration.